# *In*CONTROL

*The Dental Infection Control/Safety Supplement to Dental Items of Significance*

NUMBER 18 January 2002

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The leaves have fallen, and we are ready for the mildest winter on record (I hope). Well, our first year at Great Lakes has been professionally rewarding due to our continually growing collaborative efforts with our sister services. In the future, we hope to expand these efforts. For all of you who have contacted us by phone in the last year; that echo you have heard is not due to a problem on your phone lines, but is mysteriously located in communication cyberspace here at Great Lakes. The "phone gods" have told us that they are working the issue. Stay tuned. As I stated in the last issue of ***In*Control**, our new address is:

USAF Dental Investigation Service
Detachment 1, USAFSAM
310C B Street, Building 1H
Great Lakes Naval Training Center, IL 60088-5259

Our new phone and fax numbers are:

| | |
|---|---|
| DSN 792-7676 | DSN FAX 792-7667 |
| COMMERCIAL (847) 688-7676 | COMMERCIAL FAX (847) 688-7667 |

As always, you can contact me directly at DSN 792-7668 or Commercial at (847) 688-7668 or via e-mail at joseph.bartoloni@ndri.med.navy.mil

**DENTAL INFECTION CONTROL AND OCCUPATIONAL HEALTH/SAFETY COURSE**

The Organization for Safety and Asepsis Procedures (OSAP), the US Air Force, and the US Navy recently conducted the Dental Infection Control and Occupational Health/Safety Course at the National Naval Dental Center in Bethesda, MD from 31 October through 3 November. Over 100 students attended the course from the Air Force, Navy, Army, and civilian institutions and practices. The program was a resounding success and is tentatively scheduled for the fall of 2002. I will keep you informed about the course with an announcement in the next issue of ***In*Control**.

**2002 ORGANIZATION FOR SAFETY AND ASEPSIS PROCEDURES ANNUAL SYMPOSIUM**The 2002

Organization for Safety and Asepsis Procedures (OSAP) Annual Symposium will be conducted from 16 to 19 May in Nashville, TN. The meeting will feature the latest information on dental infection control and office safety issues. This annual symposium offers a unique opportunity to exchange ideas with the top experts in the field of dental infection control and occupational health, and provides a wealth of information on new developments. Contact OSAP for information on membership and the upcoming symposium.

OSAP
P.O. Box 6297
Annapolis, MD 21401
(800) 298-OSAP or (410) 571-0003
(410) 571-0028 (FAX)
www.osap.org

**ERGONOMICS SAFETY**

On 20 March 2001, President Bush signed a resolution repealing the Ergonomics Standard. This repeal prohibits writing new regulations "in substantially the same form" as those contained in the repealed Ergonomics Standard. It does not, however, preclude the Department of Labor from developing regulatory or legislative measures to address work-related musculoskeletal injuries from repetitive stress. The Secretary of Labor promised to pursue a comprehensive approach to ergonomics including, possibly, new rules. The Bush Administration has expressed interest in identifying new ways to address the issue.

On 7 June 2001, the Bush Administration announced public hearings toward identifying "a final course of action" on whether and how to regulate work-related repetitive motion injuries. The hearings were scheduled in July at three locations throughout the United States. An American Dental Association (ADA) representative testified during these procedures. The representative stressed the ADA's position that the Occupational Safety and Health Administration (OSHA) should not impose an employer mandate similar to the Ergonomics Standard that was rejected in March. "Any approach should be devised with an understanding of industry-specific needs and an appreciation of the disproportionate burden placed on small businesses, such as dentistry, if the agency places mandates on employers." The ADA believes the best approach is to promote a cooperative working relationship among employers and employees.

ADA officials urged Congress and the Bush Administration to use a "common sense" approach to ergonomics safety. The ADA recommends that dental workers focus on behavior modification, changes to workstation design, and proper equipment selection. "This advice instructs workers to reduce risk injury by taking simple steps to reduce discomfort and fatigue by experimenting with new postures and movements. In addition, dental workers can ensure that within their workstation, equipment is logically placed so that their exposure to potential ergonomic risk factors caused by overreaching and stretching are minimized." Also dental manufacturers are developing new ergonomically-designed instruments/equipment, and office architects are incorporating new workstation designs into their plans to minimize awkward movements. The ADA emphasizes though that patient safety and comfort must be considered when changing engineering or work practices.

The Bush Administration expects to announce details from the public hearings prior to developing an initiative to address ergonomic injuries in the workplace before the end of the year. **Recently, DIS added a briefing on Ergonomics in Dentistry to its website. This briefing can be found on the Download page of the DIS website (www.brooks.af.mil/dis).**

**OSHA RECORDKEEPING REQUIREMENTS**

Dental clinics will be exempt from the new OSHA recordkeeping regulations beginning 1 January 2002. Dental clinics and laboratories are classified as "low hazard" based on worker safety data taken over a recent three-year period. Therefore, they are exempt from the recordkeeping requirements regardless of how large or small the clinic or office.

Among other things, dental clinics are exempt from recording and reporting work-related injuries and illness, and are not required to maintain a sharps injury log. Dental employers will still be responsible for reporting any workplace incidents resulting in a fatality or the in-patient hospitalization of three or more employees within an 8-hour period. Also, dentists must still maintain other OSHA-required records such as employee medical documents, and must comply with bloodborne pathogens and hazard communication requirements. Keep in mind that even exempted dental offices may be asked in writing by either OSHA or the Labor Department's Bureau of Labor Statistics to keep illness and injury records for one year for survey purposes.

*Bottom line for Air Force Dental Clinics*
Even though dental clinics are now exempt from recordkeeping, all USAF dental clinics should still maintain

records as required by DOD/HA Policy 0000013. Recordkeeping is important because tracking work-related injuries and illnesses can facilitate future prevention efforts, and the documentation aids in identifying problem areas for correction and supports employer safety and health programs. Also, as employee awareness of injuries, illnesses, and hazards in the workplace improves, workers are more likely to follow safe work practices and report workplace hazards.

**UPDATED GUIDELINES FOR MANAGING OCCUPATIONAL EXPOSURES**

The Centers for Disease Control and Prevention (CDC) issued new guidelines on 29 June 2001 for healthcare workers potentially exposed to hepatitis and the human immunodeficiency virus (HIV) through patient care. Prevention is the primary strategy for reducing occupational exposures to bloodborne pathogens, but when exposures do occur, they should be considered a medical emergency and be reported immediately.

In 1998, the U.S. Public Health Service (PHS) published guidelines for the management of HIV exposures that included considerations for postexposure prophylaxis (PEP). Since then, the Food and Drug Administration (FDA) have cleared several new antiretroviral agents, and additional information is available about the use and safety of HIV PEP.

In September 1999, the PHS convened a meeting with expert consultants regarding occupational exposures for healthcare workers. This resulted in updated recommendations for the management of occupational exposures to HIV as well as recommendations for the management of occupational hepatitis B virus (HBV) and hepatitis C virus (HCV) exposures. The report "Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis", updates and consolidates all previous recommendations for management of healthcare personnel who have been occupationally exposed to blood and other body fluids that might contain bloodborne pathogens. The report includes recommendations on patient-care responsibilities for occupationally exposed healthcare workers, the timing and toxicity potential of PEP, and post-exposure counseling and education. It also contains practice recommendations for healthcare facilities implementing the guidelines and discusses special circumstances such as delayed exposure reports, unknown sources of exposure, pregnancy in the exposed person, and resistance of the source virus to antiretroviral agents. The document recommends consultation with local experts and/or the **National Clinicians' Post-Exposure Prophylaxis Hotline (1-888-448-4911)** if exposures occur.

The CDC has made the report available through its website at www.cdc.gov [Morbid Mortal Wkly Rep 50(RR11);1-42 (6/29/01)]. For printed copies or to ask questions about the publication, call the CDC Resource Center at 1-800-893-0485.

Anthrax has been in the news recently and many readers of ***In*Control** may have learned quit a bit about the disease from the media. The following information is provided as an overview of the various forms of the disease, their signs and symptoms, and rates of mortality.

Anthrax is a rare bacterial infection caused by the spore-forming microorganism *Bacillus anthracis*. The microbe is normally a pathogen of large herbivorous mammals. Anthrax has three modes of transmission in humans: cutaneous, gastrointestinal, and inhalation.

Individuals infected with cutaneous anthrax develop a papule where the skin was contacted by the bacteria. This is the most common form of anthrax, representing 95 percent of all cases. Cutaneous anthrax is usually due to contact with the contaminated meat, wool, hides, or leather of infected animals. Within 1 to 12 days, the papule develops into a vesicle having a necrotic ulcer. Patient symptoms include fever, malaise, headache, and regional lymphadenopathy. If untreated, 20 percent of the cases result in death.

Gastrointestinal anthrax results when individuals consume contaminated meat. The disease causes

abdominal problems and can present the following signs and symptoms: fever, septicemia, abdominal pain, nausea, vomiting of blood, and severe diarrhea. More than 25 percent of the cases are fatal.

Inhalation anthrax is the most lethal form of infection. The incubation period is from 2 to 60 days. Initial symptoms include sore throat, mild fever, muscle aches, and malaise. These symptoms, however, can quickly progress to severe respiratory distress and meningitis. If not treated immediately, death is likely.

Anthrax infection can be treated with antibiotics, but their early administration is essential. A delay in providing antibiotics treatment worsens the prognosis. The Food and Drug Administration (FDA) has cleared several antibiotics to treat anthrax, including ciprofloxacin, doxycycline, and amoxicillin. Both ciprofloxacin and doxycycline have also been cleared for post exposure prophylaxis. Prophylactic use of antibiotics for anthrax is not recommended by the Centers for Disease Control and Prevention, due to the potential for developing antibiotic-resistant organisms. A vaccine, however, has been developed to prevent infection. It was created for military personnel serving in areas that are at high risk for a bioterrorist attack. The vaccine is neither recommended nor available for the general public.

Direct person-to-person transmission of anthrax is extremely unlikely. Therefore, there is no need to vaccinate or treat contacts of infected persons, (e.g., family members, friends, coworkers etc.), unless they also were infected by the same source.

Since the mid-1990s, experts in bioterrorism (the intentional use of germs to cause harm) have hypothesized that *Bacillus anthracis* might be used by terrorists. Several countries have been known to be experimenting with biologic weapons for potential military use. Until recently, fatal anthrax has not been identified in the United States as a weapon in an act of war or terror. As of 1 November, 16 cases of anthrax infection have been confirmed and authorities believe that anthrax-contaminated U.S. mail was the transmission vehicle.

A number of government agencies have released guidelines for managing anthrax threats. If you suspect that you have received mail contaminated with biologic material, you should do the following:

I. Leave the suspect item(s) as undisturbed as possible.
II. Promptly evacuate all personnel from the immediate area.
III. Wash your hands with soap and water.
IV. Telephone the proper authorities (via 911).

All healthcare workers and at-risk groups should receive the flu vaccine, because the flu can mimic the early stages of inhalation anthrax. Because of this, individuals suffering from the flu may seek evaluation and treatment because of concern about anthrax. Preventing influenza through the appropriate use of the vaccine may ease the strain on the healthcare system.

**SMALLPOX**

Background

Although smallpox was eradicated worldwide in the late 1970s, many countries are concerned that rogue nations may be experimenting with the virus for use as a biological weapon. Several factors could contribute to an accelerated spread of smallpox if an outbreak were to occur. These factors include: 1) non-existent immunity to smallpox due to the absence of naturally-occurring disease and the discontinuation of routine vaccination in the United States in the early 1970s, 2) potentially delayed identification of smallpox by healthcare workers who are inexperienced with the disease, and 3) increased population density and mobility. Because of these factors, if a single case of smallpox were to occur, it would result in a public health crisis requiring an immediate, coordinated public health and medical response to control the outbreak and prevent further spread to susceptible individuals.

Because of the potential for smallpox to be used as a bioterrorism agent and the possibility of its rapid spread, the Centers for Disease Control and Prevention (CDC) has revised a response plan called the "Interim Smallpox Response Plan and Guidelines". The report is an updated plan outlining public health strategies that would guide the public health response to a smallpox outbreak.

## Cause

Smallpox is caused by the variola virus. The main transmission route is person-to-person spread via infective saliva droplets to the nasal, oral, or pharyngeal mucosal membranes, or to the lung alveoli from close face-to-face contact with an infected individual. Indirect transmission results from fine-particle aerosols or fomites that contain the virus. Contaminated clothing or bed linen can also spread the virus. Special precautions must be taken to ensure that these items are properly cleaned and decontaminated. Standard hospital-grade disinfectants are effective in destroying the virus on environmental surfaces, and clothing/linens can be autoclaved or washed in hot water and bleach. Infectious waste should be placed in biohazard bags and autoclaved before incineration.

## Signs and Symptoms

Smallpox symptoms usually begin within 12 to 14 days (range 7 to 17) following exposure, and consist of a 2 to 3 day prodrome of high fever, malaise, and incapacitation with severe headache and backache. This stage is then followed by the appearance of a maculopapular rash that progresses to papules (1 to 2 days after rash), vesicles (4 to 5$^{th}$ day), pustules (by 7$^{th}$ day), and finally scabs (14$^{th}$ day). The rash usually appears first on the oral mucosa, face and forearms, and then spreads to the trunk and legs. Many times, it can be seen on the palms of the hands and soles of the feet.

Smallpox patients are most infectious during the first week of the rash due to ulceration of oral mucosa lesions, which releases large amounts of virus into the saliva. Once the scabs have separated (3 to 4 weeks after rash formation), the patient is no longer infectious. The mortality rate for smallpox is approximately 30 percent. Symptomatic patients should be placed in a medical isolation room to prevent further spread. In addition, healthcare providers who have close contact with these patients should be vaccinated immediately and closely monitored for symptoms.

## Prevention and Treatment

The smallpox vaccine is highly effective. It is a live-virus vaccine called the vaccinia virus, which is similar to smallpox but can induce antibodies to protect against smallpox. The vaccine does not contain smallpox. The last case of naturally-occurring smallpox was reported in Somalia in 1977. In May 1980, the World Health Assembly certified that smallpox had been eradicated from the world. Routine immunization against smallpox, however, had already ended in 1972. It is believed that individuals who were vaccinated before 1972 are either partially immune, or have no immunity and, therefore, are susceptible to smallpox. Immunity for these individuals can be boosted using a single revaccination. Naturally, people who were born after 1972 never received the vaccine and have no immunity. Smallpox vaccine production was curtailed in the early 1980s and current supplies of the vaccine are limited. Today, vaccination against smallpox is not recommended for the general public and therefore the vaccine is not available. Because of the potential for smallpox to be used as a bioterrorism weapon, the U.S. Government has been soliciting bids from manufacturers for purchasing increased supplies of the vaccine. It is anticipated that the vaccine will be available in 1 to 2 years.

Although the vaccine is considered safe, post-vaccination adverse events can occur including progressive vaccinia (localized pustular eruption), post-vaccinial encephalitis, or severe eczema vaccinatum. Groups at high risk for developing post-vaccination complications include individuals with eczema or chronic dermatitis, and immunocompromised individuals. The vaccine is also not recommended for pregnant patients due to the small risk of fetal vaccinia. Children under the age of one, older adolescents, and young adults receiving the vaccine have an increased incidence of post-vaccination complications. Vaccinia Immune Globulin (VIG) is used to treat vaccine complications, but supplies of it are limited.

In individuals exposed to smallpox, the vaccine can decrease the severity of the disease or even prevent illness if given within 4 days of exposure. There is no proven treatment for smallpox but new antiviral agents are being evaluated. Smallpox patients can benefit from supportive therapy (intravenous fluids, medication to control pain/fever) and from antibiotics to prevent secondary bacterial infections.

The CDC has stockpiled vaccine for this type of scenario. If you suspect that you or someone you know has smallpox, contact your local health department. It is responsible for notifying the state health department, FBI, and local law enforcement. The state health department will notify the CDC. In the event of an outbreak, the CDC has guidelines to provide vaccine to exposed individuals.

**JOINT COMMISSION ON ACCREDITATION OF HEALTHCARE ORGANIZATIONS**

Many federal healthcare facilities are evaluated and accredited by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). This organization is the predominant standards-setting and accrediting body in healthcare. Its mission is to "continuously improve the safety and quality of care provided to the public through the provision of healthcare accreditation and related services that support performance improvement in healthcare organizations." The organization has developed state-of-the-art, professionally-based standards and evaluates the compliance of healthcare organizations against these benchmarks.

Each month JCAHO publishes a Sentinel Event ALERT, which identifies the most frequently occurring sentinel events (unexpected occurrences involving death or serious physical or psychological injury, or the risk thereof), describes their common underlying causes, and suggests steps to prevent future occurrences. During their on-site survey of healthcare facilities, JCAHO surveyors assess the facilities familiarity with and use of Sentinel Event ALERT. Healthcare facilities are expected (1) to review each Sentinel Event ALERT, (2) consider the suggestions, as appropriate to the facilities' services, and (3) implement the suggestions, or reasonable alternatives, or provide a reasonable explanation for not implementing relevant changes.

In August 2001, JCAHO published Sentinel Event ALERT; Issue 22 entitled "Preventing needlestick and sharps injuries." The issue was provided to increase organizational understanding of needlestick and sharps injuries and present suggestions for preventing their occurrence. It also advised organizations of the new requirement adopted in the Needlestick Safety and Prevention Act which includes: annual review of their exposure control plan to reflect consideration of safer medical devices, involving non-managerial employees in evaluating and selecting safety engineered devices, and maintenance of a sharps injury log.

<u>JCAHO surveyors are now asking healthcare organization leaders if they are familiar with the Needlestick Safety and Prevention Act, and if action is being taken to comply includes staff members who are risk of injury</u>.

**Note: Sentinel Event ALERT issues are available for downloading at www.jcaho.org.**

**BLOODBORNE PATHOGENS UPDATE**

<u>Hepatitis C</u>

The study "Treatment of Acute Hepatitis C with Interferon Alfa-2b", which was published in the November 15, 2001 issue of the *New England Journal of Medicine,* found that treatment of acute hepatitis C with interferon alfa-2b prevents chronic infection. Between 1998 and 2001, the authors identified 44 patients who had acute hepatitis C. Patients received 5 million U of interferon alfa-2b subcutaneously daily for 4 weeks, and then three times per week for another 20 weeks. Serum HCV RNA levels were measured before and during therapy and twenty-four weeks after the end of therapy. At the end of both therapy and follow-up, 42 of the 43 patients (98%) had undetectable levels of HCV RNA in their serum and normal serum alanine aminotransferase levels. Levels of HCV RNA became undetectable after an average 3.2 weeks of treatment. Therapy was well tolerated in all but one patient, who stopped therapy after 12 weeks due to medication side effects. *The study results suggest that all patients with acute hepatitis C should be treated*

*for 6 months beginning at the time of confirmed infection.*

HIV

Researchers at the CDC in Atlanta discovered a new, possibly drug-resistant HIV subtype in newly diagnosed patients who had not started therapy. Just over 3 percent of 603 patients showed mutations in a particular region of an HIV gene that give the virus a high potential to become drug-resistant. These patients had mutations that differed from mutations found in the same gene that researchers already knew made HIV resistant to zidovudine (AZT). The findings suggest that a close monitoring of treatment responses in infected patients is prudent because mutations have a higher potential to compromise the effectiveness of antiretroviral therapy efficacy.

A study in the October 10, 2001 issue of the *Journal of the American Medical Association* (2001;286:1713) showed that HIV may be highly transmissible sexually before an infected person experiences initial flu-like symptoms and before HIV tests can detect the virus. During the period shortly after transmission (called the primary HIV infection), virus levels rise rapidly in the blood, and short-lived symptoms such as fever, fatigue, and swollen glands may occur. Many times the immune system has not yet produced antibodies to the infection, and standard tests for HIV antibodies cannot detect the infection. *Researchers believe that during this early post-infection period, large amounts of the virus are shed into the genital tract and make the patient highly infectious.*

On October 18, 2000, Abbott Diagnostics informed their customers that the Abbott Murex Single Use Diagnostic System (SUDS) HIV-1 test, the only rapid HIV test currently licensed in the United States, would not be available for a certain period of time. This action was taken because of manufacturing problems that caused the test to fail. Although, Abbott has not provided a date when the test will again be available, the FDA's Centers for Biologics Evaluation and Research has reevaluated the product and cleared its release for clinical use.

Hepatitis

The FDA has approved the first combination vaccine that prevents hepatitis A and B. The new vaccine uses two existing vaccines and reduces the number of injections needed for those at risk for the diseases.

**CREUTZFELDT-JAKOB DISEASE**

Recently there have been several reports about the possible transmission of Creutzfeldt-Jakob Disease (CJD) during surgery. Although the risk of CJD infection from a contaminated instrument is extremely small, the lack of reliable and effective screening for CJD-infected patients causes fear in both patients and providers.

CJD is a rare and fatal neurological disease that affects approximately one individual in a million per year worldwide. Initial symptoms include depression, poor memory followed by dementia, and loss of physical functioning. Incubation periods can be decades long. Most cases (85%) occur in an apparent random fashion, with 10 to 15% due to genetic reasons. Fewer than 1% of the cases result from person-to person transmission due to iatrogenic exposure. Recently, a new form of CJD has been discovered in Europe (predominantly in England), called new variant CJD (nvCJD). This disease tends to strike younger people and has atypical clinical features such as prominent psychiatric or sensory symptoms at the time of clinical presentation and delayed onset of neurological symptoms.

The infectious agent responsible for CJD is called a prion. Prions do not contain genetic material and display a remarkable ability to survive routine cleaning and steam sterilization procedures. The risk of prion transmission during surgery is low. According to the CDC, there have been no reports of CJD transmission during surgery for the past 20 years. CJD is not transmitted by direct contact, or by droplet or airborne spread. Iatrogenic transmission from person to person results from direct inoculation, implantation, or transplantation of infectious materials either intracerebrally or peripherally. To date, all documented cases

of iatrogenic CJD have resulted from exposure to high-risk tissues (e.g., infectious brain, dura mater, pituitary, or eye tissue). These tissues are high risk because of the high levels of abnormal prions present in the central nervous system. CJD has not been transmitted by transfusion of human blood products.

When discussing the decontamination and sterilization of potential CJD-contaminated instruments, you must consider the type of instrument (easy or difficult to clean) and tissue exposure types (high-risk, low-risk, no-risk). In dentistry, we are dealing with no-risk tissues (blood, gingiva, peripheral nerves, saliva, bone marrow), and most of our instruments are easy to clean. **For dental procedures, there is virtually no risk of prion transmission, and so proper cleaning and routine sterilization is appropriate.** There are no published reports of iatrogenic CJD being transmitted during a dental procedure or of dental healthcare workers occupationally infected with CJD. Due to the low prevalence of CJD in the U.S., the risk of CJD transmission during any type of dental procedure is very low and does not warrant additional measures beyond standard precautions. However, devices contaminated with high-risk tissues from high-risk patients (those with known or suspected infection with CJD) require special treatment. These include proper instrument cleaning and increased time and higher temperature settings for the steam sterilizer. Please refer to the following reference for further guidance: Rutula WA, Weber DJ. Creutzfeldt-Jakob Disease: recommendations for disinfection and sterilization. Clin Infect Dis 2001;32:1348-1356.

**ULTRASONIC CLEANERS**

Cleaning is a critical part of instrument reprocessing and is the single most important step in making a medical/dental device ready for reuse. Without adequate cleaning, most disinfection and sterilization processes are ineffective. Debris on a device or instrument can interfere with its function or lead to a foreign body or pyrogen reaction in patients. An advanced cleaning technology like ultrasonic cleaning can facilitate instrument reprocessing, minimize staff exposure to contaminated items, and potentially prevent patient infections.

Ultrasonic cleaners use ultrasonic energy to optimize the cleaning of devices/instruments prior to terminal sterilization. Transducers mounted on the outside of the unit's processing basin produce the energy. The transducers expand and contract at a very high frequency, converting electric energy to ultrasonic energy waves traveling at frequencies between 20 and 120kHz, which are transmitted, into the processing basin. To enhance the transmission of the energy waves, soiled devices/instruments are placed in an appropriate liquid medium (ultrasonic cleaning solution). The energy waves produce alternating tensile and compressive forces that oscillate at the same frequency as those produced by the transducer. These oscillating forces cause millions of microscopically-sized cavities to form in the solution. Once they reach a critical threshold, the cavities collapse or implode causing submicroscopic voids to form by a process called cavitation. These voids produce high-energy shock waves that result in a powerful suction effect. The shock waves then loosen and remove debris and bioburden from devices/instruments.

Many studies have been published demonstrating the reliability and effectiveness of ultrasonic cleaning. Studies have also shown that ultrasonic cleaners are significantly more effective and efficient than manual scrubbing. Despite these benefits, ultrasonic cleaning has some limitations, including instrument damage. Materials such as quartz, silicon, and carbon steel may erode or become etched after prolonged exposure to ultrasonic cavitation. The manufacturer's manual for each instrument should be reviewed prior to processing.

Several factors can enhance or reduce the cleaning effectiveness of an ultrasonic cleaner. The most important factor is the physical properties of the cleaning solution through which the energy waves propagate. The amplitude of the energy waves is directly proportional to the electrical power applied to the transducers. Cavitation cannot occur unless the amplitude exceeds a minimum threshold value. The cleaning solutions' properties such as temperature, viscosity, density, vapor pressure, and surface tension cause the threshold value to vary, which can impact cleaning effectiveness.

Ultrasonic cleaning solutions added to the water in the processing basin aid in the removal of patient debris and increase cleaning effectiveness by reducing the water's surface tension. This facilitates the transmission of the energy waves, lowers the minimum ultrasonic energy necessary for cavitation, and reduces the resistance to flow of the water. Solutions specifically formulated for ultrasonics and known to be compatible with the devices/instruments being cleaned are recommended.

Temperature of the solution is also an important factor in cleaning effectiveness. Higher temperature causes a corresponding increase in the solution's vapor pressure, which reduces the amount of energy required for cavitation. Using warm water mixed with the cleaning solution is recommended to enhance effectiveness.

Ultrasonic cleaners can be equipped with instrument baskets and/or trays or cassettes. These accessories maximize exposure of the devices/instruments to the energy waves, and minimize movement of the devices/instruments against one another. They also optimize cleaning effectiveness by preventing the devices/instruments from contacting the bottom of the processing basin where they may prevent the transmission of the energy waves.

Instrument positioning within the processing chamber can also affect cleaning efficiency. Because ultrasonic energy travels from the transducers in one direction through the cleaning solution, properly arranging the contaminated devices/instruments in the basket/tray/cassette can maximize their exposure to the energy waves. It is recommended that the most heavily contaminated items be placed toward the bottom of the processing basin to optimize cleaning. It is important to avoid excessively stacking instruments on top on one another or overload the unit.

In addition to solution type and temperature, the time required to clean depends on several factors including the number and arrangement of contaminated items, degree of contamination, and frequency and power of the unit. Do not be in a hurry to remove instruments from the ultrasonic cleaner before the debris has been removed.

It is very important to change solutions regularly (at least daily or when visibly soiled) to improve cleaning efficacy. Each time the solution is changed, the unit should be activated without instruments for 5-10 minutes. This removes dissolved air/gases that can interfere with the cleaning process. This process is called degassing, and many manufacturers produce units with a degassing mode to facilitate this practice.

**INFECTION CONTROL Q & A**

**Question:** Do you have any suggestions for removing gross debris on instruments before they are processed?

**Answer:** Gross debris can be removed from instruments by wiping them at chair side, but only if care is taken to avoid percutaneous injuries. To prevent injuries, avoid using a two-handed technique during chair side debridement. Instead, take two or three cotton rolls and wet them with clean water, then tape the wet rolls, and two or three dry rolls to the bracket tray. To remove debris from the instruments, insert the sharp end of the instrument into the wet cotton rolls and remove, and then wipe the instrument on the dry cotton rolls to remove the remaining loose debris and excess moisture. Commercially available disposable sponges can also be used for this purpose. (If the treatment is surgical, the rolls should be sterile as should the water used to wet them.)

**Question:** Why are long fingernails on healthcare providers contraindicated during patient treatment?

**Answer:** Healthcare workers with long fingernails may be more likely to harbor bacteria that can cause

patient infections than those with shorter nails. At the annual meeting of the Infectious Diseases Society of America, researchers recently presented study findings that confirmed this. In a small pilot study, researchers examined 18 nurses with natural, unpolished fingernails for the presence of microorganisms before and after handwashing. Nail length ranged from 1 to 4.5 millimeters. The investigators found that before handwashing, all seven of the nurses who had nails longer than 3 millimeters had high levels of bacteria on their nails, compared with only 2 of the 11 healthcare workers with shorter nails. Overall, the researchers estimated that the nurses with nails longer than 3 millimeters were more than five times as likely to carry pathogens as the nurses with nails shorter than 3 millimeters. Further studies are being conducted to determine if fingernail length affects handwashing effectiveness using antimicrobial soaps and alcohol-based hand gels.

**Question:** Our clinic budget for supplies has been reduced. Can we use non-sterile exam gloves instead of sterile surgical gloves when doing surgery?

**Answer:** No. While there is minimal scientific evidence pertaining to post-operative infections among dental patients treated with sterile vs. non-sterile gloves, strong theoretical rationale supports the wearing of sterile gloves by all team members involved during a surgical case. Sterile surgical gloves must meet standards for sterility assurance established by the Food and Drug Administration. Sterile surgical gloves are less likely than non-sterile gloves to harbor microorganisms that may contaminate the operative site.

**Question:** Can we wear scrubs over our military uniform?

**Answer:** Yes, the wear of scrubs over the uniform (any combination of top and or pants) is appropriate. The key thing is to differentiate between clinical attire and personal protective equipment (PPE). Clinical attire is the basic clothing worn when providing dental treatment (i.e., military uniform, scrubs). Selection of what constitutes clinical attire is based upon facility preference. According to OSHA, however, clinical attire that does not provide protection against a hazard is not considered PPE. Clinical attire must be supplemented with long-sleeved PPE when effective isolation of the operative field cannot be accomplished and exposure to blood or other potentially infectious materials is anticipated. If clinical attire becomes contaminated during clinical treatment, the employer is responsible for laundering. Wearing scrubs over the military uniform equates to another layer of clothing over the body.

**Question:** Following sterilization, we often see peel pouches that have been punctured by the instruments in them. Is there a simple method for preventing this?

**Answer:** Yes. Recently, I received a helpful hint from the field regarding this issue. Collect the plastic protective caps from the syringe-penetrating end of local anesthetic needles. Then place them over the sharp ends of the instruments before wrapping. This technique prevents perforation of the peel pouches. This method is straightforward and cost-effective. The plastic protective caps are durable, reusable, and readily available.